## THE COMMERCE CONTROL LIST

### *CATEGORY 0 - NUCLEAR MATERIALS, FACILITIES, AND EQUIPMENT [AND MISCELLANEOUS ITEMS]*

### A. SYSTEMS, EQUIPMENT AND COMPONENTS

**0A001 "Nuclear reactors", i.e. reactors capable of operation so as to maintain a controlled, self-sustaining fission chain reaction, and equipment and components specially designed or prepared for use in connection with a "nuclear reactor", including (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0A001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Pressure vessels, i.e. metal vessels as complete units or X parts therefor, which are specially designed or prepared to contain the core of a "nuclear reactor" and are capable of withstanding the operating pressure of the primary coolant, including the top plate for a reactor pressure vessel;

b. Fuel element handling equipment, including reactor fuel charging and discharging machines;

c. Control rods specially designed or prepared for the control of the reaction rate in a "nuclear reactor", including the neutron absorbing part and the support or suspension structures therefore, and control rod guide tubes;

d. Electronic controls for controlling the power levels in "nuclear reactors", including reactor control rod drive mechanisms and radiation detection and measuring instruments to determine neutron flux levels;

e. Pressure tubes specially designed or prepared to contain fuel elements and the primary coolant in a "nuclear reactor" at an operating pressure in excess of 5.1 MPa;

f. Tubes or assemblies of tubes, made from zirconium metal or alloy in which the ratio of hafnium to zirconium is less than 1:500 parts by weight, specially designed or prepared for use in a "nuclear reactor";

g. Coolant pumps specially designed or prepared for circulating the primary coolant of "nuclear reactors";

h. Internal components specially designed or prepared for the operation of a "nuclear reactor",

including core support structures, thermal shields, baffles, core grid plates and diffuser plates;

i. Heat exchangers.

**0A002 Power generating or propulsion equipment specially designed for use with**

**space, marine or mobile "nuclear reactors". (These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121.)**

**0A018 Items on the International Munitions List.**

**License Requirements**

*Reason for Control*: NS, AT, UN

| *Control(s)* | *Country Chart* |
|---|---|
| NS applies to entire entry | NS Column 1 |
| AT applies to entire entry | AT Column 1 |
| UN applies to entire entry | Rwanda |

**License Exceptions**

LVS: $5000 for 0A018.a and .b
$3000 for 0A018.c
$1500 for 0A018.d through .f
$0 for Rwanda
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: 0A018.a, .b, and .c in $ value; 0A018.d, .e, and .f in number
*Related Controls*: N/A
*Related Definitions*: N/A

*Items*:

a. Power controlled searchlights and control units therefor, designed for military use, and equipment mounting such units; and specially designed parts and accessories therefor;

b. Construction equipment built to military specifications, specially designed for airborne transport; and specially designed parts and accessories therefor;

c. Specially designed components and parts for ammunition, except cartridge cases, powder bags, bullets, jackets, cores, shells, projectiles, boosters, fuses and components, primers, and other detonating devices and ammunition belting and linking machines (all of which are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR parts 120 through 130.)

d. Bayonets;

e. Muzzle-loading (black powder) firearms;

***Note**: Antique small arms dating prior to 1890 and their reproductions are not controlled by this ECCN 0A018.*

f. Military helmets, except:

f.1. Conventional steel helmets other than those described by 0A018.f.2 of this entry.

f.2. Helmets, made of any material, equipped with communications hardware, optional sights, slewing devices or mechanisms to protect against thermal flash or lasers.

***Note:** Helmets described in 0A018.f.1 are controlled by 0A988. Helmets described in 0A018.f.2 are controlled by the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category X).*

**0A978 Saps.**

**License Requirements**

*Reason for Control*: CC

| *Control(s)* | *Country Chart* |
|---|---|
| CC applies to entire entry | CC Column 1 |

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A979 Police helmets and shields; and parts, n.e.s.**

**License Requirements**

*Reason for Control*: CC

| *Control(s)* | *Country Chart* |
|---|---|
| CC applies to entire entry | CC Column 1 |

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A980 Horses by sea.**

**License Requirements**

*Reason for Control*: SS

*Control(s)*

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A982 Restraint devices, including thumbcuffs, leg irons, shackles, and handcuffs; straight jackets, plastic handcuffs; and parts and accessories, n.e.s.**

**License Requirements**

*Reason for Control*: CC

*Control(s)*

CC applies to entire entry. A license is required for ALL destinations, except Canada, regardless

of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A983 Specially designed implements of torture and thumbscrews; and parts and accessories, n.e.s.**

**License Requirements**

*Reason for Control*: CC

*Control(s)*

CC applies to entire entry. A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A984 Shotguns, barrel length 18 inches (45.72 cm) inches or over; buckshot shotgun shells; except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.**

**License Requirements**

*Reason for Control*: CC, FC, UN

| *Control(s)* | *Country Chart* |
|---|---|
| FC applies to entire entry. | FC Column 1 |
| CC applies to shotguns with a barrel length greater than or equal to 18 in. (45.72 cm), but less than 24 in. (60.96 cm) or buckshot shotgun shells controlled by this entry, regardless of end-user. | CC Column 1 |
| CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm), regardless of end-user. | CC Column 2 |
| CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm) if for sale or resale to police or law enforcement. | CC Column 3 |

UN applies to entire entry Rwanda

**License Exceptions**

LVS: N/A

GBS: N/A

CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: This entry does not control shotguns with a barrel length of less than 18 inches (45.72 cm). (See 22 CFR part 121.) These items are subject to the export licensing authority of the Department of State, Office of
Defense Trade Controls.
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A985 Discharge type arms (for example, stun guns, shock batons, electric cattle prods, immobilization guns and projectiles) except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.**

**License Requirements**

*Reason for Control*: CC, UN

*Control(s)*

CC applies to entire entry. A license is required for ALL destinations, except Canada, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

UN applies to entire entry Rwanda.

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A986 Shotgun shells, except buckshot shotgun shells, and parts.**

**License Requirements**

*Reason for Control*: AT, FC, UN

*Control(s)* *Country Chart*

AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information.

FC applies to entire entry FC Column 1

UN applies to entire entry. A license is required for items controlled by this entry to Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A987 Optical sighting devices for firearms (including shotguns controlled by 0A984); and parts, n.e.s.**

**License Requirements**

*Reason for Control*: FC, CC, UN

| *Control(s)* | *Country Chart* |
|---|---|
| FC applies to optical sights for firearms, including shotguns described in ECCN 0A984, and related parts | FC Column 1 |
| CC applies to entire entry | CC Column 1 |
| UN applies to entire entry | Rwanda. |

**0A988 Conventional military steel helmets as described by 0A018.f.1; and machetes.**

**License Requirements**

*Reason for Control*: UN

*Control(s)*

UN applies to entire entry. A license is required for conventional military steel helmets as described by 0A018.f.1 to Rwanda. A license is required for machetes to Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

**Note:** Exports from the U.S. and transhipments to *Iran* must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §746.7 of the EAR for additional information on this requirement.)

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0A999 Specific processing equipment, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*: AT

| *Control(s)* | *Country Chart* |
|---|---|
| AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information. | |

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Ring Magnets;

b. Reserved.

**B. TEST, INSPECTION AND PRODUCTION EQUIPMENT**

**0B001 Plant for the separation of isotopes of "natural uranium" and "depleted uranium", "special fissile materials" and "other fissile materials", and specially designed or prepared equipment and components therefor, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: "*Materials resistant to corrosion by $UF_6$*" may be copper, stainless steel, aluminum, aluminum oxide, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel and $UF_6$- resistant fluorinated hydrocarbon polymers, as appropriate for the type of separation process.
*Items*:

a. Plant specially designed for separating isotopes of "natural uranium" and "depleted uranium", "special fissile materials" and "other fissile materials", as follows:

a.1. Gaseous diffusion separation plant;

a.2. Gas centrifuge separation plant;

a.3. Aerodynamic separation plant;

a.4. Chemical exchange separation plant;

a.5. Ion-exchange separation plant;

a.6. Atomic vapor "laser" isotopic separation plant;

a.7. Molecular "laser" isotopic separation plant;

a.8. Plasma separation plant;

a.9. Electro magnetic separation plant;

b. Equipment and components, specially designed or prepared for gaseous diffusion separation process, as follows:

b.1. Bellow valves made of or protected by materials resistant to $UF_6$ (e.g. aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), with a diameter of 40 mm to 1500 mm;

b.2.a. Compressors (positive displacement, centrifugal and axial flowtypes) or gas blowers with a suction volume capacity of 1 $m^3$/min or more of $UF_6$, and discharge pressure up

to 666.7 kPa, made of or protected by materials resistant to $UF_6$ (e.g. aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel);

b.2.b. Rotary shaft seals for compressors or blowers specified in 0B001.b.2.a. and designed for a buffer gas in-leakage rate of less than 1,000 $cm^3$/min.;

b.3. Gaseous diffusion barriers made of porous metallic, polymer or ceramic materials resistant to corrosion by $UF_6$ with a pore size of 10 to 100 nm, a thickness of 5 mm or less, and, for tubular forms, a diameter of 25 mm or less;

b.4. Gaseous diffuser housings made of or protected by materials resistant to corrosion by $UF_6$;

b.5. Heat exchangers made of aluminum, copper, nickel, or alloys containing more than 60 weight percent nickel, or combinations of these metals as clad tubes, designed to operate at sub-atmospheric pressure with a leak rate that limits the pressure rise to less than 10 Pa per hour under a pressure differential of 100 kPa;

c. Equipment and components, specially designed or prepared for gas centrifuge separation process, as follows:

c.1. Gas centrifuges;

c.2. Complete rotor assemblies consisting of one or more rotor tube cylinders;

c.3. Rotor tube cylinders with a thickness of 12 mm or less, a diameter of between 75 mm and 400 mm, made from any of the following high strength-to-density ratio materials:

c.3.a. Maraging steel capable of an ultimate tensile strength of 2,050 MPa or more;

c.3.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.3.c. "Fibrous or filamentary materials" with a "specific modulus" of more than $3.18 \times 10^6$ m and a "specific tensile strength" greater than $76.2 \times 10^3$ m;

c.4. Magnetic suspension bearings consisting of an annular magnet suspended within a housing made of $UF_6$ resistant materials (e.g. aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel) containing a damping medium and having the magnet coupling with a pole piece or second magnet fitted to the top cap of the rotor;

c.5. Specially prepared bearings comprising a pivot-cup assembly mounted on a damper;

c.6. Rings or bellows with a wall thickness of 3 mm or less and a diameter of between 75 mm and 400 mm and designed to give local support to a rotor tube or to join a number together, made from any of the following high strength-to-density ratio materials;

c.6.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more;

c.6.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.6.c. "Fibrous or filamentary materials" with a "specific modulus" of more than $3.18 \times 10^6$ m and a "specific tensile strength" greater than $76.2 \times 10^3$ m;".

c.7. Baffles of between 75 mm and 400 mm diameter for mounting inside a rotor tube, made from any of the following high strength-to-density ratio materials:

c.7.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more;

c.7.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more; *or*

c.7.c. "Fibrous or filamentary materials" with a "specific modulus" of more than $3.18 \times 10^6$ m and a "specific tensile strength" greater than $76.2 \times 10^3$ m;".

c.8. Top and bottom caps of between 75 mm and 400 mm diameter to fit the ends of a rotor tube, made from any of the following high strength-to-density ratio materials:

c.8.a. Maraging steel capable of an ultimate tensile strength of 2050 MPa or more; *or*

c.8.b. Aluminum alloys capable of an ultimate tensile strength of 460 MPa or more;

c.8.c. "Fibrous or filamentary materials" with a "specific modulus" of more than $3.18 \times 10^6$ m and a "specific tensile strength" greater than $76.2 \times 10^3$ m.

c.9. Molecular pumps comprised of cylinders having internally machined or extruded helical grooves and internally machined bores;

c.10. Ring-shaped motor stators for multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600 to 2,000 Hz and a power range of 50 to 1,000 Volt-Amps;

c.11. Frequency changers (converters or inverters) specially designed or prepared to supply motor stators for gas centrifuge enrichment, having all of the following characteristics, and specially designed components therefor:

c.11.a. Multiphase output of 600 to 2000 Hz;

c.11.b. Frequency control better than 0.1%;

c.11.c. Harmonic distortion of less than 2%; *and*

c.11.d. An efficiency greater than 80%;

c.12. Centrifuge housing/recipients to contain the rotor tube assembly of a gas centrifuge, consisting of a rigid cylinder of wall thickness up to 30 mm with precision machined ends and made of or protected by $UF_6$ resistant materials;

c.13. Scoops consisting of tubes of up to 12 mm internal diameter for the extraction of $UF_6$ gas from within a centrifuge rotor tube by a Pitot tube action, made of or protected by $UF_6$ resistant materials;

d. Equipment and components, specially designed or prepared for aerodynamic separation process, as follows:

d.1. Separation nozzles consisting of slit-shaped, curved channels having a radius of curvature less than 1 mm and having a knife-edge contained within the nozzle which separates the gas flowing through the nozzle into two streams;

d.2. Tangential inlet flow-driven cylindrical or conical tubes, (vortex tubes), made of or protected by UF6 resistant materials with a diameter of between 0.5 cm and 4 cm and a length to diameter ratio of 20:1 or less and with one or more tangential inlets;

d.3. Compressors (positive displacement, centrifugal and axial flow types) or gas blowers with a suction volume capacity of 2 $m^3$/min, made of or protected by materials resistant to $UF_6$ (e.g., aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), and rotary shaft seals therefor;

d.4. Aerodynamic separation element housings, made of or protected by materials resistant to $UF_6$ to contain vortex tubes or separation nozzles;

d.5. Heat exchangers made of aluminum, copper, nickel, or alloy containing more than 60 weight percent nickel, or combinations of these metals as clad tubes, designed to operate at pressures of 600 kPa or less;

d.6. Bellows valves made of or protected by $UF_6$ resistant materials with a diameter of 40 to 1500 mm;

d.7. Process systems for separating $UF_6$ from carrier gas (hydrogen or helium) to 1 ppm $UF_6$ content or less, including:

d.7.a. Cryogenic heat exchangers and cryoseparators capable of temperatures of $-120^0$ C or less;

d.7.b. Cryogenic refrigeration units capable of temperatures of $-120^0$ C or less;

d.7.c. Separation nozzle or vortex tube units for the separation of $UF_6$ from carrier gas;

d.7.d. $UF_6$ cold traps capable of temperatures of $-20^0$ C or less;

e. Equipment and components, specially designed or prepared for chemical exchange separation process, as follows:

e.1. Fast-exchange liquid-liquid centrifugal contactors with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid, (e.g., made of or lined with suitable plastic materials such as fluorocarbon polymers or lined with glass);

e.2. Fast-exchange liquid-liquid pulse columns with stage residence time of 30 seconds or less and resistant to concentrated hydrochloric acid,(e.g., made of or lined with suitable plastic materials such as fluorocarbon polymers or lined with glass);

e.3. Electrochemical reduction cells designed to reduce uranium from one valence state to another;

e.4. Electrochemical reduction cells feed equipment to take $U^{+4}$ from the organic stream and, for those parts in contact with the process stream, made of or protected by suitable materials (e.g., glass, fluorocarbon polymers, polyphenyl sulphate, polyether sulfone and resin-impregnated graphite);

e.5. Feed preparation systems for producing high purity uranium chloride solution consisting of dissolution, solvent extraction and/or ion exchange equipment for purification and electrolytic cells for reducing the uranium $U^{+6}$ or $U^{+4}$ to $U^{+3}$;

e.6. Uranium oxidation systems for oxidation of $U^{+3}$ to $U^{+4}$;

f. Equipment and components, specially designed or prepared for ion-exchange separation process, as follows:

f.1. Fast reacting ion-exchange resins, pellicular or porous macro-reticulated resins in which the active chemical exchange groups are limited to a coating on the surface of an inactive porous support structure, and other composite structures in any suitable form, including particles or fibers, with diameters of 0.2 mm or less, resistant to concentrated hydrochloric acid and designed to have an exchange rate half-time of less than 10 seconds and capable of operating at temperatures in the range of $100^o$ C to $200^o$ C;

f.2. Ion exchange columns (cylindrical) with a diameter greater than 1000 mm, made of or protected by materials resistant to concentrated hydrochloric acid (e.g. titanium or fluorocarbon plastics) and capable of operating at temperatures in the range of $100^0$ C to $200^0$ C and pressures above 0.7 MPa;

f.3. Ion exchange reflux systems (chemical or electrochemical oxidation or reduction systems) for regeneration of the chemical reducing or oxidizing agents used in ion exchange enrichment cascades;

g. Equipment and components, specially designed or prepared for atomic vapor “laser” isotopic separation process, as follows:

g.1. High power electron beam guns with total power of more than 50 kW and strip or scanning electron beam guns with a delivered power of more than 2.5 kW/cm for use in uranium vaporization systems;

g.2. Trough shaped crucibles and cooling equipment made of or protected by materials resistant to heat and corrosion of molten uranium or uranium alloy,s (e.g., tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof);

***N.B:*** *See also 2A225.*

g.3. Product and tails collector systems made of or lined with materials resistant to the heat and corrosion of uranium vapor, such as yttria-coated graphite or tantalum;

g.4. Separator module housings (cylindrical or rectangular vessels) for containing the uranium metal vapor source, the electron beam gun and the product and tails collectors;

g.5. "Lasers" or "laser" systems for the separation of uranium isotopes with a spectrum frequency stabilizer for operation over extended periods of time;

***N.B.:*** *See also 6A005 and 6A205.*

h. Equipment and components, specially designed or prepared for molecular "laser" isotopic separation process, as follows:

h.1. Supersonic expansion nozzles for cooling mixtures of $UF_6$ and carrier gas to 150 K or less and made from $UF_6$ resistant materials;

h.2. Uranium fluoride ($UF_5$) product collectors consisting of filter, impact, or cyclone-type collectors or combinations thereof, and made of $UF_5/UF_6$ resistant materials (e.g. aluminum, aluminum alloys, nickel or alloys containing 60 weight percent of nickel and $UF_6$ resistant fully fluorinated hydrocarbon polymers);

h.3. Equipment for fluorinating $UF_5$ to $UF_6$;

h.4. Compressors made of or protected by materials resistant to $UF_6$ (e.g., aluminum, aluminum alloys, nickel or alloy containing 60 weight percent or more nickel), and rotary shaft seals therefor;

h.5. Process systems for separating $UF_6$ from carrier gas (e.g., nitrogen or argon) including:

h.5.a. Cryogenic heat exchangers and cryoseparators capable of temperatures of $-120^0$ C or less;

h.5.b. Cryogenic refrigeration units capable of temperatures of $-120^0$ C or less;

h.5.c. $UF_6$ cold traps capable of temperatures of $-20^0$ C or less;

h.6. "Lasers" or "laser" systems for the separation of uranium isotopes with a spectrum frequency stabilizer for operation over extended periods of time;

***N.B.:*** *See also 6A005 and 6A205.*

i. Equipment and components, specially designed or prepared for plasma separation process, as follows:

i.1. Product and tails collectors made of or protected by materials resistant to the heat and corrosion of uranium vapor such as yttria-coated graphite or tantalum;

i.2. Radio frequency ion excitation coils for frequencies of more than 100 kHz and capable of handling more than 40 kW mean power;

i.3. Microwave power sources and antennae for producing or accelerating ions, with an output frequency greater than 30 GHz and mean power output greater than 50 kW;

i.4. Uranium plasma generation systems;

i.5. Liquid uranium metal handling systems consisting of crucibles, made of or protected by suitable corrosion and heat resistant materials (e.g., tantalum, yttria-coated graphite, graphite coated with other rare earth oxides or mixtures thereof), and cooling equipment for the crucibles;

***N.B.:*** *See also 2A225.*

i.6. Separator module housings (cylindrical) for containing the uranium plasma source, radio-frequency drive coil and the product and tails collectors and made of a suitable non-magnetic material (e.g. stainless steel);

j. Equipment and components, specially designed or prepared for electromagnetic separation process, as follows:

j.1. Ion sources, single or multiple, consisting of a vapor source, ionizer, and beam accelerator made of suitable materials (e.g., graphite, stainless steel, or copper) and capable of providing a total ion beam current of 50 mA or greater;

j.2. Ion collector plates for collection of enriched or depleted uranium ion beams, consisting of two or more slits and pockets and made of suitable non-magnetic materials (e.g. graphite or stainless steel);

j.3. Vacuum housings for uranium electromagnetic separators made of non-magnetic materials (e.g. graphite or stainless steel) and designed to operate at pressures of 0.1 Pa or lower;

j.4. Magnet pole pieces with a diameter greater than 2 m;

j.5. High voltage power supplies for ion sources, having all of the following characteristics:

j.5.a. Capable of continuous operation;

j.5.b. Output voltage of 20,000 V or greater;

j.5.c. Output current of 1 A or greater;

j.5.d. Voltage regulation of better than 0.01% over a period of 8 hours;

***N.B.:*** *See also 3A227.*

j.6. Magnet power supplies (high power, direct current) having all of the following characteristics:

j.6.a. Capable of continuous operation with a current output of 500 A or greater at a voltage of 100 V or greater;

j.6.b. Current or voltage regulation better than 0.01% over a period of 8 hours.

***N.B.:*** *See also 3A226.*

**0B002 Specially designed or prepared auxiliary systems, equipment and components, as follows, (see List of Items Controlled) for isotope separation plant specified in 0B001, made of or protected by $UF_6$ resistant materials.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B002 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Feed autoclaves, ovens or systems used for passing $UF_6$ to the enrichment process;

b. Desublimers or cold traps, used to remove $UF_6$ from the enrichment process for subsequent transfer upon heating;

c. Product and tails stations for transferring $UF_6$ into containers;

d. Liquefaction or solidification stations used to remove $UF_6$ from the enrichment process by compressing and converting $UF_6$ to a liquid or solid form;

e. Piping systems and header systems specially designed for handling $UF_6$ within gaseous diffusion, centrifuge or aerodynamic cascades made of or protected by $UF_6$ resistant materials;

f.1. Vacuum manifolds or vacuum headers having a suction capacity of 5 $m^3$/minute or more; *or*

f.2. Vacuum pumps specially designed for use in $UF_6$ bearing atmospheres;

g. $UF_6$ mass spectrometers/ion sources specially designed or prepared for taking on-line samples of feed, product or tails from $UF_6$ gas streams and having all of the following characteristics:

g.1. Unit resolution for mass of more than 320 amu;

g.2. Ion sources constructed of or lined with nichrome or monel, or nickel plated;

g.3. Electron bombardment ionization sources; *and*

g.4. Collector system suitable for isotopic analysis.

**0B003 Plant for the conversion of uranium and equipment specially designed or prepared therefor, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B003 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Systems for the conversion of uranium ore concentrates to $UO_3$;

b. Systems for the conversion of $UO_3$ to $UF_6$;

c. Systems for the conversion of $UO_3$ to $UO_2$;

d. Systems for the conversion of $UO_2$ to $UF_4$;

e. Systems for the conversion of $UF_4$ to $UF_6$;

f. Systems for the conversion of $UF_4$ to uranium metal;

g. Systems for the conversion of $UF_6$ to $UO_2$;

h. Systems for the conversion of $UF_6$ to $UF_4$;

i. Systems for the conversion of $UO_2$ to $UCl_4$.

**0B004 Plant for the production of heavy water, deuterium or deuterium compounds, and specially designed or prepared equipment and components therefor, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B004 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Plant for the production of heavy water, deuterium or deuterium compounds, as follows:

a.1. Hydrogen sulphide-water exchange plants;

a.2. Ammonia-hydrogen exchange plants;

a.3. Hydrogen distillation plants;

b. Equipment and components, as follows, designed for:

b.1. Hydrogen sulphide-water exchange process:

b.1.a. Tray exchange towers;

b.1.b. Hydrogen sulphide gas compressors;

b.2. Ammonia-hydrogen exchange process:

b.2.a. High-pressure ammonia-hydrogen exchange towers;

b.2.b. High-efficiency stage contactors;

b.2.c. Submersible stage recirculation pumps;

b.2.d. Ammonia crackers designed for pressures of more than 3 MPa;

b.3. Hydrogen distillation process:

b.3.a. Hydrogen cryogenic distillation towers and cold boxes designed for operation below 35 K (-238° C);

b.3.b. Turboexpanders or turboexpander-compressor sets designed for operation below 35 K (-238° C);

b.4. Heavy water concentration process to reactor grade level (99.75 weight percent deuterium oxide):

b.4.a. Water distillation towers containing specially designed packings;

b.4.b. Ammonia distillation towers containing specially designed packings;

b.4.c. Catalytic burners for conversion of fully enriched deuterium to heavy water;

b.4.d. Infrared absorption analyzers capable of on-line hydrogen-deuterium ratio analysis where deuterium concentrations are equal

to or more than 90 weight percent.

**0B005 Plant specially designed for the fabrication of "nuclear reactor" fuel elements and specially designed equipment therefor.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B005 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: A plant for the fabrication of "nuclear reactor" fuel elements includes equipment which: (a) Normally comes into direct contact with or directly processes or controls the production flow of nuclear materials; (b) Seals the nuclear materials within the cladding; (c) Checks the integrity of the cladding or the seal; *and* (d) Checks the finish treatment of the solid fuel.

*Items*:

The List of Items Controlled is contained in the ECCN heading.

**0B006 Plant for the reprocessing of irradiated "nuclear reactor" fuel elements, and specially designed or prepared equipment and components therefor, including (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0B006 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Fuel element chopping or shredding machines, i.e. remotely operated equipment to cut, chop, shred or shear irradiated "nuclear reactor" fuel assemblies, bundles or rods;

b. Dissolvers, critically safe tanks (e.g. small diameter, annular or slab tanks) specially designed or prepared for the dissolution of irradiated "nuclear reactor" fuel, which are capable of withstanding hot, highly corrosive liquids, and which can be remotely loaded and maintained;

c. Counter-current solvent extractors and ion-exchange processing equipment specially designed or prepared for use in a plant for the reprocessing of irradiated "natural uranium", "depleted uranium" or "special fissile materials" and "other fissile materials";

d. Process control instrumentation specially designed or prepared for monitoring or controlling

the reprocessing of irradiated "natural uranium", "depleted uranium" or "special fissile materials" and "other fissile materials";

e. Holding or storage vessels specially designed to be critically safe and resistant to the corrosive effects of nitric acid;

***Note:*** *Critically safe tanks may have the following features:*

*1. Walls or internal structures with a boron equivalent of at least two percent;*

*2. A maximum diameter or 175 mm for cylindrical vessels; or*

*3. A maximum width of 75 mm for either a slab or annular vessel.*

f. Complete systems specially designed or prepared for the conversion of plutonium nitrate to plutonium oxide;

g. Complete systems specially designed or prepared for the production of plutonium metal.

***Note:*** *Plant for the reprocessing of irradiated "nuclear reactor" fuel elements includes equipment and components which normally come into direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.*

**0B986 Equipment specially designed for manufacturing shotgun shells; and ammunition hand-loading equipment for both cartridges and shotgun shells.**

**License Requirements**

*Reason for Control*: AT, UN

*Control(s)*

AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information.

UN applies to entire entry. A license is required for items controlled by this entry to Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0B999 Specific processing equipment, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*: AT

*Control(s)* *Country Chart*

AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information.

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Hot cells;

b. Glove boxes suitable for use with radioactive materials.

## C. MATERIALS

**0C001 "Natural uranium" or "depleted uranium" or thorium in the form of metal, alloy, chemical compound or concentrate and any other material containing one or more of the foregoing.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C001 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: 1.) See also 1A290. 2.) This entry does not control: (a) Four grams or less of "natural uranium" or "depleted uranium" when contained in a sensing component in instruments (see 10 CFR part 110); or (b) "Depleted uranium" specially fabricated for the following civil non-nuclear applications: Shielding; Packaging; Ballasts; or Counter-weights.
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0C002 "Special fissile materials" and "other fissile materials"; except, four "effective grams" or less when contained in a sensing component in instruments.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C002 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The List of Items Controlled is Contained in the ECCN heading.

**0C004 Deuterium, heavy water, deuterated paraffins and other compounds of deuterium, and mixtures and solutions containing deuterium, in which the isotopic ratio of deuterium to hydrogen exceeds 1:5000.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C004 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0C005 Graphite, nuclear-grade, having a purity level of less than 5 parts per million "boron equivalent" and with a density greater than 1.5 g/cm$^3$.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C005 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0C006 Nickel powder or porous nickel metal, specially prepared for the manufacture of gaseous diffusion barriers, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C006 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: See also 1C240
*Related Definitions*: N/A
*Items*:

a. Powder with a nickel purity content of 99.9 weight percent or more and a mean particle size of less than 10 micrometers measured by American Society for Testing and Materials (ASTM) B330 standard and a high degree of particle size uniformity; *or*

b. Porous nickel metal produced from materials specified in 0C006.a.

**0C201 Specially prepared compounds or powders, other than nickel, resistant to corrosion by $UF_6$ (e.g. aluminum oxide and fully fluorinated hydrocarbon polymers), for the manufacture of gaseous diffusion barriers, having a purity of 99.9 weight percent or more and a mean particle size of less than 10 micrometers measured by American Society for Testing and Materials (ASTM) B330 standard and a high degree of particle size uniformity.**

**License Requirements**

*Reason for Control*:

*Control(s)*

Items described in 0C201 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

**License Exceptions**

LVS: N/A
GBS: N/A
CIV: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled in contained in the ECCN heading.

## D. SOFTWARE

**0D001 "Software" specially designed or modified for the "development", "production", or "use" of items described in 0A001, 0A002, 0B (except 0B986 and 0B999), or 0C.**

**License Requirements**

*Reason for Control*:

*Control(s)*

"Software" for items described in 0A001, 0B001, 0B002, 0B003, 0B004, 0B005, 0B006, 0C001, 0C002, 0C004, 0C005, 0C006, or 0C201 is subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

"Software" for items described in 0A002 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

**License Exceptions**

CIV: N/A
TSR: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A

*Items*:

The List of Items Controlled is contained in the ECCN heading.

**0D999 Specific software, as follows (see List of Items Controlled).**

**License Requirements**

*Reason for Control*: AT

*Control(s)* *Country Chart*

AT applies to entire entry. A license is required for items controlled by this entry to North Korea for anti-terrorism reasons. The Commerce Country Chart is not designed to determine AT licensing requirements for this entry. See §742.19 of the EAR for additional information.

**License Exceptions**

CIV: N/A
TSR: N/A

**List of Items Controlled**

*Unit*: $ value
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

a. Software for neutronic calculations/modeling;

b. Software for radiation transport calculations/modeling;

c. Software for hydrodynamic calculations/modeling.

## E. TECHNOLOGY

**0E001 "Technology," according to the Nuclear Technology Note, for the "development", "production", or "use" of items described in 0A001, 0A002, 0B (except 0B986 and 0B999), 0C, or 0D001.**

**License Requirements**

*Reason for Control*:

*Control(s)*

"Technology" for items described in 0A001, 0B001, 0B002, 0B003, 0B004, 0B005, 0B006, 0C001, 0C002, 0C004, 0C005, 0C006, 0C201, or 0D001 (applies to "software" in 0D001 for all items except those described in 0A002) is subject to the export licensing authority of the Department of Energy (see 10 CFR part 810).

"Technology" for items described in 0A002 and 0D001 (applies to "software" in 0D001 for items described in 0A002 only) is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

**License Exceptions**

CIV: N/A
TSR: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The List of Items Controlled is contained in the ECCN heading.

**0E018 "Technology" for the "development", "production", or "use" of items controlled by 0A018.b through 0A018.e.**

**License Requirements**

*Reason for Control*: NS, UN, AT

| *Control(s)* | *Country Chart* |
|---|---|
| NS applies to entire entry. | NS Column 1 |
| UN applies to entire entry. | Rwanda. |
| AT applies to entire entry. | AT Column 1 |

**License Exceptions**

CIV: N/A
TSR: Yes, except N/A for Rwanda

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0E982 "Technology" exclusively for the "development" or "production" of equipment controlled by 0A982 or 0A985.**

**License Requirements**

*Reason for Control:* CC

*Control(s)*

CC applies to "technology" for items controlled by 0A982 or 0A985. A license is required for ALL destinations, except Canada, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

**License Exceptions**

CIV: N/A
TSR: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**0E984 "Technology" for the "development" or "production" of shotguns controlled by 0A984 and buckshot shotgun shells.**

**License Requirements**

*Reason for Control*: CC, UN

| *Control(s)* | *Country Chart* |
|---|---|
| CC applies to "technology" for shotguns with a barrel length over 18 in. (45.72 cm) but less than 24 in. (60.96 cm) and shotgun shells, regardless of end-user | CC Column 1 |
| CC applies to "technology" for shotguns with a barrel length over 24 in. (60.96 cm), regardless of end-user | CC Column 2 |
| CC applies to "technology" for shotguns with a barrel length over 24 in. (60.96 cm) if for sale or resale to police or law enforcement | CC Column 3 |
| UN applies to entire entry | Rwanda. |

**License Exceptions**

CIV: N/A
TSR: N/A

**List of Items Controlled**

*Unit*: N/A
*Related Controls*: N/A
*Related Definitions*: N/A
*Items*:

The list of items controlled is contained in the ECCN heading.

**EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or* in any other category in the CCL are designated by the number EAR99.**